

WHAT IS CLAIMED IS:

1. A nucleic acid molecule comprising a polynucleotide fragment having a nucleotide sequence that encodes at least a C-terminal portion of an i-antigen polypeptide having amino acid sequence SEQ ID NO:6.
2. The nucleic acid molecule of claim 2 comprising SEQ ID NO:1.
3. A nucleic acid molecule comprising a polynucleotide fragment having a nucleotide sequence that encodes at least an antigenic portion of an i-antigen polypeptide having amino acid sequence SEQ ID NO:7.
4. A nucleic acid molecule comprising a polynucleotide fragment having a nucleotide sequence that encodes at least one terminal portion of an i-antigen polypeptide having amino acid sequence SEQ ID NO:7.
5. The nucleic acid molecule of claim 4 comprising SEQ ID NO:3 or SEQ ID NO:5.
6. The nucleic acid molecule of claims 1, 3 or 4 that is a vector capable of expressing the polypeptide encoded by the nucleic acid sequence in a cell or an organism, wherein the cell or organism is selected from the group consisting of a bacterium, a protozoan, a yeast, an insect and an animal cell or organism.
7. The nucleic acid molecule of claim 6 that is capable of expressing the polypeptide encoded by the nucleic acid sequence in *E. coli*, *Pischia pastoris* or *Tetrahymena*.
8. A nucleic acid molecule encoding an antigenic polypeptide that shares a

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significant level of primary structure with at least one of a 55 kD i-antigen protein from a G5 isolate of *Ichthyophthirius* and a 48 kD i-antigen protein from a G1 isolate of *Ichthyophthirius*.

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9. The nucleic acid molecule of claim 8 encoding an antigenic polypeptide that shares a significant level of primary structure with at least one of SEQ ID NO:6 and SEQ ID NO:7.

10. A nucleic acid molecule that is substantially complementary to the nucleic acid molecule of claims 1, 3, 4, or 8.

11. A nucleic acid molecule comprising a polynucleotide fragment that hybridizes to at least a portion of the complement of at least one of SEQ ID NO:1 or SEQ ID NO:3, under standard hybridization conditions, wherein the polynucleotide fragment encodes a polypeptide comprising at least a membrane targeting portion or an antigenic portion of an i-antigen protein.

12. A polypeptide selected from the group consisting of:
an i-antigen polypeptide having SEQ ID NO:6;
an i-antigen polypeptide having SEQ ID NO:7;
an analog or modification of an i-antigen polypeptide having SEQ ID NO:6;
a fragment of an i-antigen polypeptide having SEQ ID NO:6
wherein the fragment comprises at least a C-terminal portion of SEQ ID NO:6;
an analog or modification of an i-antigen polypeptide having SEQ ID NO:7;
a fragment of an i-antigen polypeptide having SEQ ID NO:7
wherein the fragment comprises at least one terminal portion of SEQ ID NO:7; and

an antigenic fragment of an i-antigen polypeptide having SEQ ID NO:7; and

an i-antigen polypeptide that shares a significant level of primary structure with at least one of SEQ ID NO:6 and SEQ ID NO:7.

13. The polypeptide of claim 12 that is antigenic.

14. A composition for inducing an immune response in a fish comprising at least one component selected from the group consisting of (a) a polypeptide comprising an antigenic portion of an i-antigen polypeptide and (b) a nucleic acid molecule comprising a polynucleotide fragment having a nucleotide sequence encoding an antigenic portion of an i-antigen polypeptide.

15. The composition of claim 14 comprising a polypeptide of claim 13.

16. The composition of claim 14 comprising at least one of the nucleic acid molecules of claims 1, 3, 4, 8 or 10.

17. The composition of claim 14 wherein administration of the composition to fish prevents or controls *I. multifiliis* infection.

18. The composition of claim 14 comprising a nucleic acid molecule comprising a polynucleotide fragment having a nucleotide sequence encoding an antigenic portion of an i-antigen polypeptide linked at its carboxy-terminus to a plurality of molecules of the C3d component of complement.

19. The composition of claim 14 formulated for oral administration.

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20. The composition of claim 19 wherein the polypeptide or nucleic acid molecule is encapsulated in a biodegradable polymer.
21. A host cell transformed with the nucleic acid molecule of claim 6.
22. A fish comprising the nucleic acid molecule of any of claims 1, 3 or 4.
23. ~~Transformed *Tetrahymena* comprising the nucleic acid molecule of any of claims 1, 3 or 4.~~
24. An antibody capable of binding a polypeptide of claim 12.
25. A method for detecting *Ichthyophthirius* in an aquaculture comprising:
obtaining a sample containing nucleic acid from an aquaculture fish or an aquaculture water;
adding at least one primer oligonucleotide having a sequence complementary to at least a portion of SEQ ID NO:1 or SEQ ID NO:3 to the nucleic acid sample;
conducting a polymerase chain reaction amplification with the sample;
and analyzing the reaction mixture for the presence of a product amplified by the at least one oligonucleotide primer.
26. The method of claim 25 wherein the primer is capable of amplifying nucleotide sequences encoding i-antigens derived from least two different *I. multifiliis* serotypes.
27. The method of claim 26 wherein the primer has a nucleic acid sequence that encodes an amino acid sequence selected from the group consisting of MKYNILLT (SEQ ID NO:36), FLSISLLF (SEQ ID NO:38), GTALDDGV (SEQ ID NO:46), AGTDTCT (SEQ ID NO:48), CTKKLTSGA (SEQ ID NO:50) and FAKFLSISL (SEQ ID NO:52).

28. The method of claim 25 further comprising making an polynucleotide vaccine comprising at least a portion of the amplified product, wherein the portion of the amplified product encodes an antigenic polypeptide.

29. The method of claim 25 further comprising making a protein subunit vaccine comprising an antigenic polypeptide encoded by at least a portion of the amplified product.

30. The method of claims 28 or 29 further comprising administering the vaccine to fish to treat or prevent *Ichthyophthirius* infection.

31. A method for identifying an *I. multifiliis* serotype comprising:
providing a sample comprising an *I. multifiliis* nucleic acid molecule having a nucleotide sequence encoding an i-antigen;
adding to the sample at least one primer oligonucleotide having a sequence complementary to a unique region of an *I. multifiliis* nucleotide sequence encoding an i-antigen;
subjecting the sample to amplification conditions; and
analyzing the sample to determine the presence of a product amplified by the at least one oligonucleotide primer.

32. A method for inducing an immune response in a fish comprising administering to the fish the immunogenic composition of claim 14.

33. The method of claim 32 performed prophylactically in advance of exposure to *I. multifiliis*.

34. The method of claim 32 performed therapeutically while the fish is infected with *I. multifiliis*.

35. The method of claim 32 wherein administration is performed by injection, immersion, or oral ingestion.

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